



Pest Management Regulatory Agency
Agence de réglementation de la lutte antiparasitaire

Re-evaluation Note

REV2007-02

Acephate Interim Measures

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1.0 Background

On 22 October 2004, Proposed Acceptability for Continuing Registration (PACR) document PACR2004-40, *Re-evaluation of Acephate*, was published for consultation. Health Canada's Pest Management Regulatory Agency (PMRA) has reviewed the comments received as well as refined the risk assessment to incorporate additional toxicology and exposure data and the rate reductions proposed by the registrant. The registrants have been informed by letter of these mitigation measures and the time frame to comply with them.

2.0 Regulatory Action

At this time, interim measures will be implemented. The registrant has recently applied to register a new pellet formulation of acephate that will reduce worker exposure and may replace the need for water soluble packaging of the soluble powder product as described in the PACR. The buffer zones to protect aquatic habitats presented in the PACR have been revised based on the current model used by the PMRA. The re-entry intervals (REI) have been revised based on additional toxicology and exposure data and on the rate reductions proposed by the registrant. The REIs for celery, corn, lettuce, potatoes, tobacco and trees are the maximum considered practical for growers.

These changes have resulted in the revision of the label statements proposed in PACR2004-40 and the recommendation to implement interim mitigation measures (Appendix I of this Re-evaluation Note).

A final regulatory decision resulting from the re-evaluation of acephate will be made in the future, considering the new formulation and any new relevant information. This will include reconsideration of the need for a product stewardship program. A regulatory document will be published at that time, including comments made to the PMRA in response to PACR2004-40 and responses to these comments.

Appendix I Use Standard for Commercial Class Products Containing Acephate

(Note: The information in this appendix summarizes the acceptable uses, limitations and minimum personal protective equipment (PPE) for the commercial class products containing acephate resulting from this re-evaluation. This use standard does not identify all label requirements for individual end-use products such as first aid statements, disposal statements, precautionary statements and supplementary PPE that may be required. Additional information on labels for currently registered products should not be removed unless it contradicts information in this use standard.)

COMMON NAME: Acephate

CHEMICAL NAME: O,S-dimethyl acetylphosphoramidothioate

FORMULATION TYPES: Soluble powder
Implant cartridge

SITE CATEGORIES:

4	Forests and Woodlots
6	Greenhouse Non-Food Crops
14	Terrestrial Food Crops
27	Ornamentals Outdoor

GENERAL LIMITATIONS: DO NOT APPLY BY AIR

INTERIM MITIGATION MEASURES AND LABEL CHANGES

TOXICOLOGICAL INFORMATION

- A. Labels of pesticide products carry statements regarding symptoms of poisoning and treatment, which are especially important for those who may be overexposed when working with the product in a commercial or industrial setting (e.g., mixers/loaders who handle more concentrated forms). Based on the toxicological assessments, the label text of products containing acephate should be expanded and/or standardized, as follows:

Toxicological Information

Acephate is an organophosphate that is a cholinesterase inhibitor. Typical symptoms of overexposure to cholinesterase inhibitors include headache, nausea, dizziness, sweating, salivation, runny nose and eyes. This may progress to muscle twitching, weakness, tremor, incoordination, vomiting, abdominal cramps and diarrhea in more serious poisonings. A life-threatening poisoning is signified by loss of consciousness, incontinence, convulsions and respiratory depression with a secondary cardiovascular component. Treat symptomatically. If exposed, plasma and red blood cell cholinesterase tests may indicate degree of exposure (baseline data are useful). Atropine, only by injection, is the preferable antidote.

Oximes, such as pralidoxime chloride, may be therapeutic if used early; however, use only in conjunction with atropine. In cases of severe acute poisoning, use antidotes immediately after establishing an open airway and respiration. With oral exposure, the decision of whether to induce vomiting or not should be made by an attending physician.

- B.** For those products that contain greater than 10% petroleum distillates, the following text should also be added to the Toxicological Information section (placed at the end of the paragraph presented above), as an additional aid to the attending physician:

NOTE: Product contains a petroleum distillate solvent.

PRECAUTION STATEMENTS

PROTECTIVE CLOTHING AND EQUIPMENT

As interim mitigation until the formulation is replaced by a pellet formulation, the following protective clothing and equipment are required for the soluble powder formulation.

Mixing/Loading/Application:

A. Mixing and loading in all agricultural scenarios

- Mixers/loaders must wear maximum level PPE (i.e., chemical-resistant coveralls over a long-sleeved shirt and long pants, chemical-resistant gloves and a respirator).

B. Applying using groundboom and soil injection equipment

- Applicators must wear cotton coveralls over a long-sleeved shirt and long pants, chemical-resistant gloves and a respirator.
- When handling 24 kg a.i. or less in one day (e.g., approximately 18 ha at highest agricultural rate of 1.31 kg a.i./ha), workers may use an open cab.
- When handling more than 24 kg a.i. in one day, workers must use a closed cab (no gloves or respirator are required in a closed cab) or wear maximum level PPE (chemical-resistant coveralls over a long-sleeved shirt and long pants, chemical-resistant gloves and a respirator).

C. Applying using airblast (mist-blower) equipment

- Applicators must use a closed cab and wear a long-sleeved shirt and long pants. No gloves or respirator are required in a closed cab.
- If the use of a closed cab is not feasible, applicators may use an open cab and wear maximum level PPE (i.e., chemical-resistant coveralls over a long-sleeved shirt and long pants, chemical-resistant gloves and a respirator) and a chemical-resistant headgear.

D. Applying using handheld equipment

- Mixers/loaders/applicators must wear cotton coveralls over a long-sleeved shirt and long pants, chemical-resistant gloves and a respirator.
- Mixers/loaders/applicators must not handle more than 1500 L/day of diluted product.

E. Applying using encapsulated implants

- Applicators must wear a long-sleeved shirt, long pants and chemical-resistant gloves.

Postapplication:

- Do not enter or allow worker entry into treated areas during the re-entry intervals (REIs) as listed below:

Brussels sprouts	12 hours
Cabbage	12 hours
Cauliflower	12 hours
Celery	1 day*
Corn	5 days*
Cranberries	12 hours
Lettuce	1 day*
Peppers	1 day
Potatoes	1 day*
Cut flowers/roses	1 day
Saskatoon berries	not applicable—no postapplication exposure
Tobacco	1 day*
Tomatoes	12 hours
Ornamentals	12 hours
Trees	3 days*

- * Workers conducting activities that involve significant foliar contact must wear gloves and cotton covers for the following time after the REI:

Corn	4 weeks
Celery	2 weeks
Lettuce	2 weeks
Tobacco	2 weeks
Potatoes	1 week
Trees	1 week

ENVIRONMENTAL HAZARDS:

TOXIC to bees exposed to direct treatment, drift or residues on flowering crops or weeds. **DO NOT** apply this product to flowering crops or weeds if bees are visiting the treatment area. Minimize the spray drift to reduce harmful effects on bees in habitats close to the application site.

TOXIC to birds and wild mammals. Applications may adversely affect birds and wildlife visiting the treatment area.

The use of this product may result in contamination of groundwater particularly in areas where soils are permeable (e.g., sandy soil) and/or the depth to the water table is shallow.

TOXIC to aquatic organisms. Observe buffer zones as specified under DIRECTIONS FOR USE.

DIRECTIONS FOR USE:

DO NOT apply this product directly to freshwater habitats (such as lakes, rivers, sloughs, ponds, prairie potholes, creeks, marshes, streams, reservoirs, ditches and wetlands), estuaries or marine habitats.

Field sprayer application: **DO NOT** apply during periods of dead calm. Avoid application of this product when winds are gusty. **DO NOT** apply with spray droplets smaller than the American Society of Agricultural Engineers (ASAE) fine classification.

Airblast application: **DO NOT** apply during periods of dead calm. Avoid application of this product when winds are gusty. **DO NOT** direct spray above plants to be treated. Turn off outward pointing nozzles at row ends and outer rows. **DO NOT** apply when wind speed is greater than 16 km/h at the application site as measured outside of the treatment area on the upwind side.

Buffer Zones:

The buffer zones specified in the table below are required between the point of direct application and the closest downwind edge of (1) sensitive freshwater habitats (such as lakes, rivers, sloughs, ponds, prairie potholes, creeks, marshes, streams, reservoirs and wetlands), and (2) estuarine or marine habitats.

Method of Application	Buffer Zone (metres) Required for the Protection of Aquatic Habitat With Water Depth of:		
	< 1 metre	1–3 metres	> 3 metres
Field sprayer*	15	5	0
Airblast (early growth stage)	25	10	3

* For field sprayer application, buffer zones can be reduced with the use of drift reducing spray shields. When using a spray boom fitted with a full shield (shroud, curtain) that extends to the crop canopy or ground, the labelled buffer zone can be reduced by 70%. When using a spray boom where individual nozzles are fitted with cone-shaped shields that are no more than 30 cm above the crop canopy or ground, the labelled buffer zone can be reduced by 30%.

ACCEPTABLE COMMERCIAL USES FOR ACEPHATE

General Application Instructions and Limitations

Soluble Powder

DO NOT handle more than 1500 L of diluted spray solution per day when using hand-held spray equipment.

Food Crops

Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed.

Repeat if re-infestation occurs.

Ornamentals

Cut flowers (greenhouse and field): **DO NOT** apply more than 0.83 kg a.i./ha

Other ornamentals and trees: **DO NOT** apply more than 1.31 kg a.i./ha.

Re-entry Interval (REI) for ornamental shrubs and flowers (except for roses): 12 hours

REI for trees: 3 days (workers re-entering this crop and conducting activities that involve significant foliar contact must wear gloves and cotton coveralls for 1 week after the REI.)

REI for cut flowers/roses: 1 day

Implant Cartridge

Use sites may include trees in Christmas tree plantations, seed orchards, high value stands, nurseries, golf courses, and residential or commercial landscape plantings where foliar sprays or soil applied systemic insecticide sprays are not desirable.

DO NOT implant into trees where fruit, nuts or syrup is to be used for sale or consumption.

DO NOT implant into trees having less than 7.5 cm trunk diameter.

DO NOT use implants on trees other than those listed on this label.

DO NOT use implants on trees entering dormancy.

DO NOT repeat implant treatments where tree has not shown the ability to adequately close over the prior treatment.

DO NOT remove cartridges previously implanted.

DO NOT break plastic gelatin.

DO NOT place implant too deep.

NUMBER OF IMPLANTS REQUIRED PER TREE: Determine the tree trunk diameter (DBH), multiply by 3.14 and divide by 10.16. Implant around the tree trunk base at 10.16 cm intervals. Drill 0.95 cm diameter implant holes at 10.16 cm spacing, spiralling up and around the tree trunk base. Holes should be drilled 3.2 cm deep (into the tree trunk, i.e., from the cambium layer) to assure that the cartridge head can be implanted beneath the bark and cambium surface. Cartridges left extending through the bark layer will delay or inhibit wound closure.

Where lower branching occurs 1.5 metres from the ground, make certain the implants are placed directly beneath the lower branches. This will assure adequate distribution of chemical throughout the tree.

IN AREAS OF PUBLIC ACCESS: Ensure that implant holes are covered with a suitable tree wound dressing prior to leaving treated trees.

Applications timed with maximum upward flow of tree sap produce the most successful results. This characteristic may vary with tree species, geographic area, time of day, individual tree vigour or light intensity at time of treatment. If soil moisture conditions are dry, a thorough deep root watering prior to or immediately following implant treatment will enhance chemical uptake.

It takes 4–7 days for the insecticide to attain effective levels in the foliage of the tree (as early as 2 days if trees are in a healthy vegetative growth condition). Maximum duration of control documented is 18 weeks. Optimum control of severe infestations is 10–12 weeks. When re-treatment is necessary, place the new implants in a spiral pattern between and above or below the previous treatment.

SITE(S)	PESTS	RATE (a.i.)	APPLICATION INSTRUCTIONS AND LIMITATIONS
Cabbage, cauliflower, Brussels sprouts	Cabbage looper, imported cabbageworm, diamondback moth, green peach aphid	563–825 g/ha	Soluble powder Apply in 225 to 1650 L of water using conventional ground application equipment. Use the high rate only when heavy pest infestations are present. Do not feed trimmings to livestock or allow animals to graze on treated areas. Do not apply more than 2 applications per season. Re-entry Interval (REI): 12 hours Preharvest Interval (PHI): 28 days
Head lettuce (crisp head type only)	Cabbage looper, imported cabbageworm, diamondback moth, green peach aphid		Soluble powder Apply in 225 to 1650 L of water using conventional ground application equipment. Use the high rate only when heavy pest infestations are present. Do not feed trimmings to livestock or allow animals to graze on treated areas. Do not apply more than 4 applications per season. REI: 1 day Workers re-entering this crop and conducting activities that involve significant foliar contact must wear gloves and cotton coveralls for 2 weeks after the REI. PHI: 7 days
Celery	Green peach aphid, tarnished plant bug		Soluble powder Apply in 225 to 1650 L of water. Apply when insects reach economic threshold levels. Do not apply more than 4 applications per season. REI: 1 day Workers re-entering this crop and conducting activities that involve significant foliar contact must wear gloves and cotton coveralls for 2 weeks after the REI. PHI: 21 days

SITE(S)	PESTS	RATE (a.i.)	APPLICATION INSTRUCTIONS AND LIMITATIONS
Corn (seed and sweet)	European corn borer		Soluble powder Apply in 220 to 1000 L of spray mix using conventional ground application equipment. Use the high rate only when heavy pest infestations are present. For European corn borer, apply when egg mass count indicates an economically damaging population. Do not feed corn fodder or forage from treated crop to livestock. Do not apply more than 4 applications per season. REI: 5 days Workers re-entering this crop and conducting activities that involve significant foliar contact must wear gloves and cotton coveralls for 4 weeks after the REI. PHI: 21 days
Potato	Green peach aphid, potato aphid, potato flea beetle, potato leafhopper, tarnished plant bug		Soluble powder Apply in 225 to 1650 L of water per hectare using conventional ground application equipment. Use the high rate only when heavy pest infestations are present. Begin applications at first sign of insects and repeat on a 7- to 10-day schedule as necessary. Do not apply more than 4 applications per season. REI: 1 day Workers re-entering this crop and conducting activities that involve significant foliar contact must wear gloves and cotton coveralls for 1 week after the REI. PHI: 21 days
Saskatoon berries (non-bearing)	Woolly elm aphid	637 mg/L 1275 mg/plant	Soluble powder Soil Injection Application: Provides control of woolly elm aphid in non-bearing Saskatoon berry plants. Can be used in first three years of establishment. Apply once per year in mid July or early August. Mix 637 mg a.i./L water (equivalent to 6.37 g a.i./10 L of water). Apply 2 litres of this solution per plant. The solution is injected with a probe; 3 to 5 injections for each plant to a depth of 12 cm. The injection should be made 15 cm from the stem of the plant. REI: not applicable since no postapplication exposure

SITE(S)	PESTS	RATE (a.i.)	APPLICATION INSTRUCTIONS AND LIMITATIONS
Sweet pepper (Bell type)	Green peach aphid, pepper maggot	562 g/ha	Soluble powder Apply in 225 to 1650 L of water with conventional ground application equipment. Begin applications when eggs or insects appear. Maintain a 7 to 10 day spray schedule until insects have been reduced below economic levels. Do not apply more than 4 applications per season. REI: 1 day
	European corn borer	825 g/ha	
Tobacco (flue cured)	Tomato hornworm, flea beetle, green peach aphid	563–825 g/ha	Soluble powder Apply in at least 100 L of water per hectare using conventional ground application equipment. Apply on a 7-day schedule or as needed. Use 825 g a.i./ha for control of established populations. REI: 1 day Workers re-entering this crop and conducting activities that involve significant foliar contact must wear gloves and cotton coveralls for 2 weeks after the REI. PHI: 3 days
	Darksided cutworm (pre-plant)	563 g/ha (cover crop treatment) 1125 g/ha (soil treatment)	Soluble powder Treat either the rye or wheat cover crop or the soil using at least 200 L of water per hectare. Applications are most effective when applied late afternoon or early evening when temperatures are 13°C or higher. Apply soon after the cutworms have hatched (mid to late April, 4 to 5 days before plowing). REI: 1 day Workers re-entering this crop and conducting activities that involve significant foliar contact must wear gloves and cotton coveralls for 2 weeks after the REI.
Tobacco (flue cured)	Darksided cutworm (post-plant)	1125 g/ha	Soluble powder Apply in sufficient water to give good coverage of seedlings. Apply in the late afternoon or evening. REI: 1 day Workers re-entering this crop and conducting activities that involve significant foliar contact must wear gloves and cotton coveralls for 2 weeks after the REI.

SITE(S)	PESTS	RATE (a.i.)	APPLICATION INSTRUCTIONS AND LIMITATIONS
Tobacco	Darksided cutworm, potato flea beetle, root maggots, green peach aphid, thrips	825-1275 g/ha	Soluble powder Transplant water treatment: Provides control for approximately 2 to 3 weeks after transplanting. Apply in a minimum of 1200 L of transplant water per hectare. Do not apply more than 1275 g a.i./ha as a transplant water application as some phytotoxicity may occur. REI: 1 day Workers re-entering this crop and conducting activities that involve significant foliar contact must wear gloves and cotton coveralls for 2 weeks after the REI.
	Wireworm	825 g/ha	Soluble powder Transplant water treatment: Apply in 1200 L of transplant water per hectare. Make one application per season at transplanting. REI: 1 day Workers re-entering this crop and conducting activities that involve significant foliar contact must wear gloves and cotton coveralls for 2 weeks after the REI.
Cranberry	Blackheaded fireworm	562 g/ha	Soluble powder Apply one prebloom application to control the first generation of blackheaded fireworm where field scouting indicates insect numbers warrant treatment. Apply in 225 to 1650 L of water per hectare using conventional ground equipment. A second application may be made post bloom if insect numbers indicate it is required. REI: 12 hours
Tomato	Cutworms, potato flea beetle, root maggots, wireworm, aphids, thrips, Colorado potato beetle	900 g/ha	Soluble powder Transplant water application: To provide control of listed pests for approximately 2 to 3 weeks after transplanting, apply in 2000 L of water per hectare. This rate is based on 14 000 plants per hectare. REI: 12 hours
Abelia, forsythia, fruitless mulberry, laurel, magnolia	Scale insect (crawlers: cottony maple, hemlock, oystershell, cottony cushion, lecanium)	Mist blower: 1312 g/1000 L Hydraulic sprayer: 637 g/1000 L	Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Spray 2 times, 7 to 10 days apart.
	Alyssum, daisy		
	Bottlebrush, honey locust		

SITE(S)	PESTS	RATE (a.i.)	APPLICATION INSTRUCTIONS AND LIMITATIONS
Camellia	Greenhouse whitefly, mealybug, scale insect (crawlers: cottony maple, hemlock, oystershell, cottony cushion, lecanium), spider mites (except two-spotted)	Mist blower: 1312 g/1000 L Hydraulic sprayer: 637 g/1000 L	Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Spray 2 times, 7 to 10 days apart.
Daylily	Flower thrips, two-spotted spider mite		Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Spray 2 times, 7 to 10 days apart.
Gladiolus	Flower thrips, gladiolus thrips		
Lantana	Greenhouse whitefly		
Pachysandra, phlox	Two-spotted spider mite		
Yew (taxus)	Mealybug		
Yucca	Flower thrips, scale insect (crawlers: cottony maple, hemlock, oystershell, cottony cushion, lecanium)		
Alder	Fall webworm, leafminer, psyllids		Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs.
Ash	Aphid, fall webworm, gypsy moth, lace bug, sawflies (open feeders: blackheaded ash), tent caterpillar (eastern and forest), tussock moth		

SITE(S)	PESTS	RATE (a.i.)	APPLICATION INSTRUCTIONS AND LIMITATIONS
Aspen, bloodleaf (Iresine), dusty miller, flowering almond, flowering quince, gazania, mock orange, photinia, pittosporum, tulip	Aphid		Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs.
Boston ivy	Potato leafhopper		
Cedar	Bagworm, gypsy moth		
Cockspur thorn	Cankerworm (spring and fall)		
Deutzia	Aphid, leafminer		
Flowering plum	Aphid, tent caterpillar (eastern and forest)		
Hawthorn	Aphid, cankerworm (spring and fall), gypsy moth, tent caterpillar (eastern and forest)		
Larch	Sawflies (open feeders: redheaded pine sawfly)		
Linden	Aphid, bagworm, cankerworm (spring and fall), fall webworm, tussock moth, yellownecked caterpillar		
Locust	Leafminer		
Poplar	Aphid, fall webworm, gypsy moth, poplar tentmaker, tent caterpillar (eastern and forest), tussock moth	Mist blower: 1312 g/1000 L Hydraulic sprayer: 637 g/1000 L	

SITE(S)	PESTS	RATE (a.i.)	APPLICATION INSTRUCTIONS AND LIMITATIONS
Rhododendron	Lace bug		
Silver maple	Cankerworm (spring and fall)		
Slippery elm	Casebearers		
Spirea	Aphid, obliquebanded leafroller		
Staghorn sumac	Obliquebanded leafroller		
Sumac	Psyllids		
Sweet gum	Bagworm		
Sycamore	Aphid, bagworm, casebearers, fall webworm, lace bug, obliquebanded leafroller, tussock moth		
Shade trees, ornamentals, shelterbeds (such as cotoneaster, willow, mountain ash and pincherry)	Pear slug (pear sawfly larvae)		
Wild cherry	Tussock moth		
Arborvitae	Aphid, bagworm, spider mites (except two-spotted)		Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control spider mites, spray 2 times, 7 to 10 days apart.
Aster	Aphid, armyworm, flower thrips, leafminer		Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control flower thrips, spray 2 times, 7 to 10 days apart.

SITE(S)	PESTS	RATE (a.i.)	APPLICATION INSTRUCTIONS AND LIMITATIONS
Azalea	Aphid, greenhouse whitefly, lace bug, mealybug, scale insect (crawlers: cottony maple, hemlock, oystershell, cottony cushion, lecanium), spider mites (except two-spotted)		Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control greenhouse whitefly, mealybug, scale insects and spider mites (other than two-spotted), spray 2 times, 7 to 10 days apart.
Barberry, ligustrum, Mahonia	Aphid, greenhouse whitefly	Mist blower: 1312 g/1000 L Hydraulic sprayer: 637 g/1000 L	Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control greenhouse whitefly, spray 2 times, 7 to 10 days apart.
Boxwood, Euonymous, Hibiscus, Nandina, rose of Sharon	Aphid, scale insect (crawlers: cottony maple, hemlock, oystershell, cottony cushion, lecanium)		Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control scale insects, spray 2 times, 7 to 10 days apart.
Calendula	Aphid, armyworm (fall, beet and yellowstriped), flower thrips, potato leafhopper, tobacco budworm		Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control flower thrips, spray 2 times, 7 to 10 days apart.
Cotoneaster	Aphid, lace bug, scale insect (crawlers: cottony maple, hemlock, oystershell, cottony cushion, lecanium)		Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control scale insects, spray 2 times, 7 to 10 days apart.
Cypress	Bagworm, scale insect (crawlers: cottony maple, hemlock, oystershell, cottony cushion, lecanium), spider mites		Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control scale insects and spider mite, spray 2 times, 7 to 10 days apart.

SITE(S)	PESTS	RATE (a.i.)	APPLICATION INSTRUCTIONS AND LIMITATIONS
Dahlia	Armyworm (fall, beet and yellowstriped), potato leafhopper, two-spotted spider mite		Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control two-spotted spider mite, spray 2 times, 7 to 10 days apart.
Elm (Chinese or Siberian)	Elm leaf beetle (larvae), tussock moth, armyworm (fall, beet and yellowstriped) on Chinese elm only, scale insect (crawlers: cottony maple, hemlock, oystershell, cottony cushion, lecanium) on Chinese elm only		Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control scale insects, spray 2 times, 7 to 10 days apart.
Geranium	Tobacco budworm, scale insect (crawlers: cottony maple, hemlock, oystershell, cottony cushion, lecanium)		
Hackberry	Psyllids, scale insect (crawlers: cottony maple, hemlock, oystershell, cottony cushion, lecanium)		
Hemlock	Gypsy moth, scale insect (crawlers: cottony maple, hemlock, oystershell, cottony cushion, lecanium), spider mites (except two-spotted)	Mist blower: 1312 g/1000 L Hydraulic sprayer: 637 g/1000 L	Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control scale insects and spider mites (other than two-spotted spider mite), spray 2 times, 7 to 10 days apart.

SITE(S)	PESTS	RATE (a.i.)	APPLICATION INSTRUCTIONS AND LIMITATIONS
Holly	Leafminer, obliquebanded leafroller, psyllids, tussock moth, scale insect (crawlers: cottony maple, hemlock, oystershell, cottony cushion, lecanium), spider mites (except two-spotted)		Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control scale insects and spider mites (other than two-spotted spider mite), spray 2 times, 7 to 10 days apart.
Hydrangea, primrose	Aphid, two-spotted spider mite		Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control two-spotted spider mites, spray 2 times, 7 to 10 days apart.
Ivy	Aphid, mealybug		Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control mealybugs, spray 2 times, 7 to 10 days apart.
Juniper	Bagworm, meadow spittlebug, spider mites (except two-spotted)		Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control spider mites (other than two-spotted spider mite), spray 2 times, 7 to 10 days apart.
Lilac	Aphid, leafminer, scale insect (crawlers: cottony maple, hemlock, oystershell, cottony cushion, lecanium)		Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control scale insects, spray 2 times, 7 to 10 days apart.

SITE(S)	PESTS	RATE (a.i.)	APPLICATION INSTRUCTIONS AND LIMITATIONS
Marigold	Flower thrips, leafminer, sunflower moth, two-spotted spider mite	Mist blower: 1312 g/1000 L Hydraulic sprayer: 637 g/1000 L	Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control flower thrips and two-spotted spider mites, spray 2 times, 7 to 10 days apart.
Petunia	Armyworm (fall, beet and yellowstriped), flower thrips, tobacco budworm		Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control flower thrips, spray 2 times, 7 to 10 days apart.
Pyracantha	Aphid, lace bug, yellownecked caterpillar, scale insect (crawlers: cottony maple, hemlock, oystershell, cottony cushion, lecanium)		Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control scale insects, spray 2 times, 7 to 10 days apart.
Rose (field grown)	Aphid, armyworm (fall, beet and yellowstriped), flower thrips, meadow spittlebug, obliquebanded leafroller, rose midge, tussock moth, scale insect (crawlers: cottony maple, hemlock, oystershell, cottony cushion, lecanium), spider mites		Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control flower thrips, scale insects and spider mites, spray 2 times, 7 to 10 days apart.
Salvia	Aphid, flower thrips, greenhouse whitefly		Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control flower thrips and greenhouse whitefly, spray 2 times, 7 to 10 days apart.

SITE(S)	PESTS	RATE (a.i.)	APPLICATION INSTRUCTIONS AND LIMITATIONS
Snapdragon	Aphid, armyworm (fall, beet and yellowstriped), flower thrips, tobacco budworm		Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control flower thrips, spray 2 times, 7 to 10 days apart.
Viburnum	Aphid, greenhouse whitefly, two-spotted spider mite		Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control greenhouse whitefly and two-spotted spider mite, spray 2 times, 7 to 10 days apart.
Willow	Aphid, bagworm, willow leaf beetle (larvae), fall webworm, gypsy moth, poplar tentmaker, psyllids, sawflies (open feeders: dusky birch), tent caterpillar (eastern and forest), tussock moth, scale insect (crawlers: cottony maple, hemlock, oystershell, cottony cushion, lecanium)		Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control scale insects, spray 2 times, 7 to 10 days apart.
Visteria	Aphid, mealybugs, scale insect (crawlers: cottony maple, hemlock, oystershell, cottony cushion, lecanium)		Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control mealybugs and scale insects, spray 2 times, 7 to 10 days apart.
Zinnia	Flower thrips, greenhouse whitefly, lace bug, leafminer	Mist blower: 1312 g/1000 L Hydraulic sprayer: 637 g/1000 L	Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control flower thrips and greenhouse whitefly, spray 2 times, 7 to 10 days apart.

SITE(S)	PESTS	RATE (a.i.)	APPLICATION INSTRUCTIONS AND LIMITATIONS
Birch	Aphid, cankerworm (spring and fall), fall webworm, gypsy moth, leafminer, sawflies (open feeders: dusky birch), tent caterpillar (eastern and forest), tussock moth, yellownecked caterpillar		Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs.
	Aphid (green)	849 mg/cartridge 1 cartridge per 10.16 cm	Implant cartridge Apply when wingless forms are first noticed.
	Birch leafminer		Implant cartridge Apply when insects first appear.
Elm	Wooly aphid		Implant cartridge Apply only when heavy production of white waxy material becomes evident.
	Elm leaf beetle		Implant cartridge Apply as eggs are hatching or larvae are first noticed.
Fir	Aphid, tussock moth, scale insect (crawlers: cottony maple, hemlock, oystershell, cottony cushion, lecanium), spider mites (except two-spotted)	Mist blower: 1312 g/1000 L Hydraulic sprayer: 637 g/1000 L	Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control scale insects and spider mites (except two- spotted spider mite), spray 2 times, 7 to 10 days apart.
	Spruce coneworm western spruce budworm	849 mg/cartridge 1 cartridge per 10.16 cm	Implant cartridge Apply immediately prior to or at budswell.
Flowering cherry	Obliquebanded leafroller, tent caterpillar (eastern and forest)	Mist blower: 1312 g/1000 L Hydraulic sprayer: 637 g/1000 L	Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs.
	Eastern tent caterpillar	849 mg/cartridge 1 cartridge per 10.16 cm	Implant cartridge Apply when insects first appear.

SITE(S)	PESTS	RATE (a.i.)	APPLICATION INSTRUCTIONS AND LIMITATIONS
Maple	Aphid, bagworm, cankerworm (spring and fall), gypsy moth, potato leafhopper, tent caterpillar (eastern and forest), tussock moth, scale insect (crawlers: cottony maple, hemlock, oystershell, cottony cushion, lecanium)	Mist blower: 1312 g/1000 L Hydraulic sprayer: 637 g/1000 L	Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control scale insects, spray 2 times, 7 to 10 days apart.
	Bladder gall mites	849 mg/cartridge 1 cartridge per 10.16 cm	Implant cartridge Apply only if very high populations of galls develop on foliage.
	Gypsy moth larvae		Implant cartridge Apply as eggs are hatching or when insects first appear.
Oak	Aphid, cankerworm (spring and fall), fall webworm, gypsy moth, lace bug, leafminer, obliquebanded leafroller, oak leaf shredder (white and red oak only), tent caterpillar (eastern and forest), tussock moth, yellownecked caterpillar, scale insect (crawlers: cottony maple, hemlock, oystershell, cottony cushion, lecanium), spider mites (except two-spotted)	Mist blower: 1312 g/1000 L Hydraulic sprayer: 637 g/1000 L	Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control scale insects and spider mites (other than two-spotted spider mite), spray 2 times, 7 to 10 days apart.
	Wooly aphid	849 mg/cartridge 1 cartridge per 10.16 cm	Implant cartridge Apply only when heavy production of white waxy material becomes evident.
	Gypsy moth aphid		Implant cartridge Apply when eggs are hatching or when insects first appear.
	Oak leafshredder		Implant cartridge Apply when insects first appear.

SITE(S)	PESTS	RATE (a.i.)	APPLICATION INSTRUCTIONS AND LIMITATIONS
Pine	Bagworm, gypsy moth, Nantucket pine tip moth, sawflies (open feeders: redheaded pine, European pine sawfly), tussock moth, scale insect (crawlers: cottony maple, hemlock, oystershell, cottony cushion, lecanium), spider mites (except two-spotted)	Mist blower: 1312 g/1000 L Hydraulic sprayer: 637 g/1000 L	Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control scale insects and spider mites (other than two-spotted spider mite), spray 2 times, 7 to 10 days apart.
	Wooly aphid	849 mg/cartridge 1 cartridge per 10.16 cm	Implant cartridge Apply when wingless forms are first noticed.
	Pine needleminer		Implant cartridge
	Cone maggots		Apply immediately prior to or at budswell.
Spruce	Gypsy moth, leafminer, sawflies (open feeders: redheaded pine, yellowheaded spruce sawfly), tussock moth, spider mites (except two-spotted)	Mist blower: 1312 g/1000 L Hydraulic sprayer: 637 g/1000 L	Soluble powder Mix thoroughly and spray entire plant covering both sides of foliage. Spray when insects are present or feeding injury is first noticed. Repeat application once only, if re-infestation occurs. To control spider mites (other than two-spotted spider mite), spray 2 times, 7 to 10 days apart.
	Green aphid, wooly aphid	849 mg/cartridge 1 cartridge per 10.16 cm	Implant cartridge Apply when wingless forms are first noticed.
	Spruce coneworm		Implant cartridge
	Western spruce budworm		Apply immediately prior to or at budswell.
Greenhouse roses	Aphid, flower thrips, omnivorous leafroller, rose midge, whitefly	637 g/1000 L	Spray to wet foliage completely.

SITE(S)	PESTS	RATE (a.i.)	APPLICATION INSTRUCTIONS AND LIMITATIONS
Christmas tree plantations, farm woodlots, tree nurseries, shelter belts, right of ways, municipal parks (excluding national and provincial parks)	Aphid, armyworm (fall, beet and yellowstriped), bagworm, cankerworm (fall and spring), casebearer, fall webworm, flower thrips, gladiolous thrips, greenhouse whitefly, gypsy moth, lace bug, leaf beetle larvae (elm and willow), leafminer, meadow spittlebug, mealybug, Nantucket pine tip moth, oak leafshredder, obliquebanded leafroller, psyllid, pear slug (pear sawfly larvae), poplar tentmaker, potato leafhopper, rose midge, scale insect (crawlers: cottony maple, hemlock, oystershell, cottony cushion, lecanium), sawflies (open feeders: dusky birch, blackheaded ash, redheaded pine, European pine, yellowheaded spruce sawfly), spider mites, sunflower moth, tent caterpillars (eastern and forest), tobacco budworm, tussock moth, yellownecked caterpillar	Hydraulic sprayer: 637 g/1000 L Mist blower: 1312 g/1000 L	Consult Canadian Forestry Service office or provincial forestry authority for information on timing of sprays and method of application. Do not apply to American elm, flowering crabapple, sugar maple, cottonwood, redbud and weigelia, as foliage injury may occur. Before treating rare or unusual varieties, it is advisable to test it on a few plants before spraying large numbers.

